foreshadowed by the presence of the centrosomes during the growth period. Two hemispherical spermatids are thus formed, each containing a large nucleus and centrosome. Each spermatid metamorphoses into a motile (ciliated) spermatozoön of about the shape of the spermatozoön of Ascaris, so well known to zoölogists. During this metamorphosis the centrosome resolves itself into an elongated band-like structure in the cytoplasm; from one side of it radiations are seen projecting. A process of the nucleus is for a long time directed outward toward the deep end of this band, indicating that the nucleus is concerned in the changes which are taking place. The centrosome band ultimately comes to lie in a long spiral of about five turns just under the curved surface of the cell. The cytoplasmic radiations emerge from the surface as a spiral band of cilia, which remain attached to the centrosome band as to a basal plate; they form the locomotor apparatus of the spermatozoön. The greater part of the mature spermatozoön consists of a large nucleus, which is covered with a thin but perfectly distinct layer of cytoplasm, in which lies the centrosome band bearing the cilia.

Ikeno regards the centrosome band as homologous with the middle piece of the animal spermatozoön, the centrosome being known to pass into the middle piece in animal spermatogenesis; the cilia he regards as corresponding with the flagellum of animal spermatozoa. In fertilization a spermatozoön makes its way through the fluid which has accumulated around the egg-cell, bores into the egg-cell and loses its cilia and cytoplasm, after which its nucleus moves toward the oval egg nucleus, sinking into a ready formed depression (Empfängnisshöhle) on its peripheral end. The sperm and egg nuclei now fuse completely, no centrosome being visible during the process, nor in the nuclear division which follows. In this division the spindle fibers do not converge at either end of the mitotic figure, but lie parallel with each other throughout their whole length. The entire absence of centrosomes during fertilization is strongly in contrast to what is known of fertilization in animals.

W. E. C.

Botrytis and its Host. — The relation of Botrytis to its host plants has recently been studied by Nordhausen.[1] With some preliminary account of the infection of living plants by this fungus through the surface of wounds, where by reason of the injured cells Botrytis may readily begin its usual saprophytic existence, he passes to

[1] Nordhausen, M. Beiträge zur Biologie parasitärer Pilze, *Jahrb. f. Wissenschaft*, Botanik, Bd. xxxiii, pp. 1–46.

the consideration of the infection of uninjured tissue. By means of injecting into plants water containing Botrytis spores, it was possible to note the effect of their germination far removed from the point of injury. He found that from the time when the spores in the intercellular spaces began to produce any sign of hyphæ, the near-by cells showed evidence of disorganization. The cell walls turned brown and ultimately also the cell contents, until eventually death of the affected parts ensued. By numerous experiments he arrived at the conclusion that this is due to the secretion of a poison by the germinating spore. Into the cells so killed the Botrytis mycelium can now readily make its way, and by further excretion of the poisonous substance spread, mayhap, through the whole tissue of the plant. According to the author, it is by this means alone that Botrytis is able to assume its apparently true parasitic habit, although the hyphæ cannot penetrate the living cells themselves. Experiments with Penicillium showed that this fungus has no such power of killing cells on which it is growing; in other words, that it does not secrete a poisonous substance, and can only penetrate cells which themselves are in a weakened or diseased condition. The relation of Botrytis to its host is simple compared with that of a true parasite, which usually induces complicated hypertrophies. With Botrytis it is simply a question of killing the cells to effect an entrance in the first place, and a continuance of this process to effect a further development of the fungus. A large class of plant diseases must be included under the same head. Under natural conditions, where infection takes place through an injured surface, the spread of the fungus resolves itself into the question as to whether the host plant can form an impermeable covering of wound cork faster than the hemiparasite can destroy the cells around the point of infection.

H. M. R.

Notes. — No. 15 of the new series of *Contributions from the Gray Herbarium*, by M. L. Fernald, deals with certain species of Eleocharis and Scirpus, and is published as No. 19 of the current volume of the *Proceedings of the American Academy of Arts and Sciences.*

A conspectus of the genus Lilium is published by Professor Waugh in the *Botanical Gazette* for April.

"Grazing Problems in the Southwest" and "Poa Fendleriana and its Allies" are the titles of two recent papers by J. G. Smith, published from the Division of Agrostology of the United States Department of Agriculture.